

## CLAIMS

1       1.(**withdrawn**)       A composition comprising a modified nucleotide including a molecular and/or  
2       atomic tag, where the nucleotide alters base incorporation fidelity in a nucleotide polymerizing agent  
3       relative to a base incorporation fidelity of the agent in the absence of the modified nucleotide.

1       2.(**withdrawn**)       The composition of claim 1, wherein the modified nucleotide comprises a  $\beta$   
2       and/or  $\gamma$  phosphate modified nucleotide.

1       3.(**withdrawn**)       The composition of claim 1, wherein the modified nucleotide comprises a  $\beta$   
2       phosphate modified nucleotide.

1       4.(**withdrawn**)       The composition of claim 1, wherein the modified nucleotide comprises a  $\gamma$   
2       phosphate modified nucleotide.

1       5.(**withdrawn**)       The composition of claim 4, wherein the tag comprises a molecule.

1       6.(**withdrawn**)       The composition of claim 5, wherein the tag is ANS.

1       7.(**currently amended**)       A method for using modified nucleotides to alter base incorporation  
2       fidelity comprising the step of adding a modified nucleotide including a molecular tag to a nucleotide  
3       polymerization medium comprising a nucleotide polymerizing agent, a primer and a template, where  
4       the modified nucleotide **alters increases** base incorporation fidelity of the nucleotide polymerizing  
5       agent relative to a base incorporation fidelity of the nucleotide polymerizing agent in the absence of  
6       the modified nucleotide **to produce an extended primer having reduced incorrect base incorporations.**

1       8.(**original**)       The method of claim 7, wherein the modified nucleotide comprises a  $\beta$  and/or  $\gamma$   
2       phosphate modified nucleotide.

1       9.(**original**)       The method of claim 7, wherein the modified nucleotide comprises a  $\beta$  phosphate  
2       modified nucleotide.

1 10.(original) The method of claim 7, wherein the modified nucleotide comprises a  $\gamma$  phosphate  
2 modified nucleotide.

1 11.(canceled) The method of claim 10, wherein the tag comprises a molecular tag.

1 12.(currently amended) The method of claim 10, wherein the tag comprises aminonaphthalene-  
2 1-sulfonate (ANS).

1 13.(currently amended) A method for using modified nucleotides to alter base incorporation  
2 fidelity comprising the step of adding a modified nucleotide including a molecular tag to an assay  
3 for extending a nucleotide sequence, where the modified nucleotide alters base incorporation fidelity  
4 of a nucleotide polymerizing agent relative to a base incorporation fidelity of the polymerizing agent  
5 in the absence of the modified nucleotide, and the assay is selected from the group consisting of  
6 genotyping for *in vitro* reproductive methods (human and other organisms); single nucleotide  
7 polymorphism (SNP) detection; DNA sequencing; RNA sequencing; single nucleotide extension  
8 assays; amplified DNA product assays; rolling circle product assays; PCR product assays; allele-  
9 specific primer extension assays; single-molecule arrays (DNA, RNA, protein) assays; and drug  
10 toxicity evaluation assays.

1 14.(withdrawn) A method for making blunt-ended fragments comprising the steps of  
2 amplifying a DNA fragment in the presence of a nucleotide including a molecular and/or atomic tag  
3 on a  $\gamma$  phosphate group and/or a base moiety, where the tag alters fidelity of base incorporation and  
4 decreases or eliminates non-templated addition of a base to the 3' end of the DNA fragment being  
5 amplified.

1 15.(currently amended) A kit for performing a nucleotide polymerizing reaction comprising  
2 using at least one modified nucleotide including a molecular tag in the presence of a polymerizing  
3 agent, a primer and a template, where the modified nucleotide alters polymerizing agent extension  
4 fidelity for the at least one modified nucleotide compared to the polymerizing agent extension  
5 fidelity in the presence of the unmodified nucleotide corresponding to the at least one modified  
6 nucleotide.

1 16.(**withdrawn**) A method of inhibiting or preventing pyrophosphorolysis during synthesis of  
2 a nucleic acid molecule, said method comprising  
3 (a) combining a primer with a nucleic acid template under conditions sufficient to form a hybridized  
4 product; and  
5 (b) incubating the hybridized product with a polymerase in the presence or absence of an enzyme  
6 selected from the group consisting of a pentosyltransferase, a phosphotransferase with alcohol group  
7 as acceptor, a nucleotidyltransferase, and a carboxy-lyase, under conditions sufficient to form a  
8 second nucleic acid molecule complementary to all or a portion of the nucleic acid template,  
9 where a tagged nucleotide comprises an atomic and/or molecular tag or moiety attached to  
10 and/or associated with a  $\beta$  and/or  $\gamma$ -phosphate and/or a base moiety of the nucleotide is added at  
11 either or both steps to inhibit or prevent pyrophosphorolysis during synthesis of a nucleic acid  
12 molecule.

1 17.(**withdrawn**) A composition comprising a nucleotide including a molecular and/or atomic  
2 tag on a phosphate group adapted to alter the fidelity of viral replication.

1 18.(**withdrawn**) The composition of claim 17, wherein the virus is HIV.

1 19.(**withdrawn**) A method for increasing the fidelity of replication comprising administering  
2 an therapeutically effective amount of a nucleotide including a molecular and/or atomic tag on a  $\gamma$   
3 phosphate group to an animal including a human, where the nucleotide is designed to increase base  
4 incorporation fidelity during replication.

1 20.(**withdrawn**) The method of claim 19, wherein the replication is caused by an HIV virus.

1 21.(**currently amended**) The method of claim 7, wherein the tag is covalently bonded to the  
2 modified nucleotide through a linker.

1 22.(**currently amended**) The method of claim 7, wherein the tag is covalently bonded to the  
2 modified nucleotide.

23.(currently amended) The method of claim 10, wherein the molecular tag comprises a fluorophore selected from the group consisting of 4-acetamido-4'isothiocyanatostilbene-2,2'disulfonic acid; acridine and derivatives: acridine, acridine isothiocyanate; 5- (2'-aminoethyl) aminonaphthalene-1-sulfonic acid (EDANS); 4-amino-3-vinylsulfonyl phenyl] naphthalimide-3,5 disulfonate; - (4-anilino-1-naphthyl) maleimide; anthranilamide; BODIPY; Brilliant Yellow; coumarin and derivatives: coumarin, 7-amino-4-methylcoumarin (AMC, Coumarin 120), 7-amino-4-trifluoromethylcoumarin (Coumarin 151); cyanine dyes; cyanosine; 4', 6-diaminidino-2-phenylindole (DAPI); 5', 5''-dibromopyrogallol-sulfonaphthalein (Bromopyrogallol Red); 7-diethylamino-3-(4'-isothiocyanatophenyl)-4-methylcoumarin; diethylenetriamine pentaacetate; 4,4'-diisothiocyanatodihydro-stilbene-2,2'-disulfonic acid; 4,4' diisothiocyanatostilbene-2,2'-disulfonic acid; 5-dimethylamino naphthalene-1-sulfonyl chloride (DNS, dansylchloride); 4-dimethylaminophenylazophenyl-4'-isothiocyanate (DABITC); eosin and derivatives: eosin, eosin isothiocyanate, erythrosin and derivatives: erythrosin B, erythrosin, isothiocyanate; ethidium; fluorescein and derivatives: 5-carboxyfluorescein (FAM), 5- (4, 6-dichlorotriazin-2-yl) amino fluorescein (DTAF), 2', 7'-dimethoxy-4',5'-dichloro-6-carboxyfluorescein (JOE), fluorescein, fluorescein isothiocyanate, QFITC, (XRITC); fluorescamine; IR144; IR1446; Malachite Green isothiocyanate; 4-methylumbelliferone-ortho cresolphthalein; nitrotyrosine; pararosaniline; Phenol Red; B-phycoerythrin; o-phthalaldehyde; pyrene and derivatives: pyrene, pyrene butyrate, succinimidyl 1-pyrene; butyrate quantum dots; Reactive Red 4 (Cibacron™ Brilliant Red 3B-A) rhodamine and derivatives: 6-carboxy-X-rhodamine (ROX), 6-carboxyrhodamine (R6G), lissamine rhodamine B sulfonyl chloride rhodamine (Rhod), rhodamine B, rhodamine 123, rhodamine X isothiocyanate, sulforhodamine B, sulforhodamine 101, sulfonyl chloride derivative of sulforhodamine 101 (Texas Red); N, N, N', N'-tetramethyl-6-carboxyrhodamine (TAMRA); tetramethyl rhodamine; tetramethyl rhodamine isothiocyanate (TRITC); riboflavin; rosolic acid; terbium chelate derivatives; Cy 3; Cy 5; Cy 5.5; Cy 7; IRD 700; IRD 800; La Jolla Blue; phthalocyanine; and naphthalocyanine.

24.(currently amended) The method of claim 10, wherein the molecular tag is selected from the group consisting of alkyl groups having between 1 and 30 carbon atoms, aryl groups having between about 6 and about 40 carbon atoms, or alkaryl and aralkyl groups having between about 7

4 and about 40 carbon atoms, or mixture or combinations thereof, where the carbon atoms are replace  
5 by one or more hetero atoms in the structure provided the structure represents a stable molecular  
6 system, where the hetero atoms selected from the group consisting of P, S, Si, N, and O.

1 25.(currently amended) The method of claim 10, wherein the molecular tag is selected from  
2 the group consisting of 4-aminophenol, 6-aminonaphthol, 4-nitrophenol, 6-nitronaphthol, 4-  
3 methylphenol, 6-chloronaphthol, 4-methoxyphenol, 6-bromonaphthol, 4-chlorophenol, 6-  
4 iodonaphthol, 4-bromophenol, 4, 4'-dihydroxybiphenyl, 4-iodophenol, 8-hydroxyquinoline, 4-  
5 nitronaphthol, 3-hydroxypyridine, 4-aminonaphthol, umbelliferone, 4-methylnaphthol, resorufin, 4-  
6 methoxynaphthol, 8-hydroxypyrene, 4-chloronaphthol, 9-hydroxyanthracene, 4-bromonaphthol, 6-  
7 nitro-9-hydroxyanthracene, 4-iodonaphthol, 3-hydroxyflavone, 6-methylnaphthol, fluorescein, 6-  
8 methoxynaphthol, 3-hydroxybenzoflavone, 1-hydroxy-2-propyne, 1-hydroxy-4-pentyne, 1-hydroxy-  
9 3-butyne, 1-hydroxy-5-hexyne, Methanol, Ethanol, Propanol, Isopropanol, Butanol, Tert-butanol,  
10 Hexanol, Cyclohexanol, Heptanol, Octanol, Decanol, Undecanol, Dodecanol, 1-acetoxymethanol  
11 (CH<sub>3</sub>OCCH<sub>2</sub>-O-NTP), 2-acetoxyethanol, 3-acetoxypopropanol, 4-acetoxybutanol, 5-acetoxypentanol,  
12 6-acetoxyhexanol, 2-nitroethanol, 3-nitropropanol, 4-nitrobutanol, 5-nitropentanol, 5-nitrohexanol,  
13 1-hydroxy-3-propene, 1-hydroxy-2-cyclohexene, 1-hydroxy-4-butene, 1-hydroxy-3-propaldehyde,  
14 1-hydroxy-5-pentene, 1-hydroxy-4-butanaldehyde, 1-hydroxy-6-hexene, 1-hydroxy-3-Butanone,  
15 Phenol, 4-methyl-3-hydroxypyridine, 4-Carboxyphenol, 5-methoxy-3-hydroxypyridine, 4-  
16 Acetoxymethylphenol, 5-nitro-3-hydroxypyridine, 4-nitrophenol, 5-acetoxymethyl-3-  
17 hydroxypyridine, 4-methylphenol, 6-methyl-8-hydroxyquinoline, 4-methoxyphenol 6-methoxy-8-  
18 hydroxyquinoline, 4-ethylphenol, 4-methyl-8-hydroxyquinoline, 4-butylphenol, 6-nitro-8-  
19 hydroxyquinoline, naphthol, 4-acetoxymethyl-8-hydroxyquinoline, 4 or 6 or 8 methylnaphthol  
20 pyrene, 4 or 6 or 8 methoxynaphthol, 6-methyl-8-hydroxypyrene, 4 or 6 or 8 nitronaphthol, 6-ethyl-  
21 8-hydroxypyrene, 4 or 6 or 8 ethylnaphthol, 6-nitro-8-hydroxypyrene, 4 or 6 or 8 butylnaphthol 6-  
22 (carboxysuccinimidylester) fluorescein, 4 or 6 or 8 acetoxymethylnaphthol, 6-carboxymethyl-2, 7-  
23 dichlorofluorescein, Methanol Cyclohexanol, 2-carboxy ethanol, 3-carboxypropanol, 4-  
24 carboxybutanol, 2-hydroxyethanol, 3-hydroxypropanol, 4-hydroxybutanol, 2-aminoethanol, 2-  
25 nitroethanol, 3-aminopropanol, 3-nitropropanol, 4-aminobutanol, and 4-nitrobutanol.

26.(previously presented) The method of claim 10, wherein the modified nucleotide is selected from the group consisting of Adenosine-5'- ( $\gamma$ -ANS) triphosphate, Guanosine-5'- ( $\gamma$ -ANS) triphosphate, Cytosine-5'- ( $\gamma$ -ANS) triphosphate, Thymidine-5'- ( $\gamma$ -ANS) triphosphate, Adenosine-5'- ( $\gamma$ -4-nitrophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-iodonaphthyl), Guanosine-5'- ( $\gamma$ -4-nitrophenyl) triphosphate, triphosphate Adenosine-5'- ( $\gamma$ -6-methylnaphthyl) triphosphate, Cytosine-5'- ( $\gamma$ -4-nitrophenyl) triphosphate, Thymidine-5'- ( $\gamma$ -4-nitrophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -6-methoxynaphthyl) triphosphate, Uracil-5'- ( $\gamma$ -4-nitrophenyl) triphosphate, 3'-azido-3'-deoxythymidine-5'- ( $\gamma$ -4-nitrophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -6-aminonaphthyl) triphosphate, 3'-azido-2', 3'-dideoxythymidine-5'- ( $\gamma$ -4-nitrophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -6-nitronaphthyl) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'- ( $\gamma$ -4-nitrophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -6-chloronaphthyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-aminophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -6-bromonaphthyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-methylphenyl) triphosphate, Adenosine-5'- ( $\gamma$ -6-iodonaphthyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-methoxyphenyl) triphosphate, Adenosine-5'- ( $\gamma$ -4'-hydroxybiphenyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-chlorophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -8-quinolyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-bromophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -3-pyridyl) triphosphate, Adenosine-5'- ( $\gamma$ -umbelliferone), Adenosine-5'- ( $\gamma$ -4-iodophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-nitronaphthyl) triphosphate, Adenosine-5'- ( $\gamma$ -resorufin) triphosphate, Adenosine-5'- ( $\gamma$ -pyrene) triphosphate, Adenosine-5'- ( $\gamma$ -4-aminonaphthyl) triphosphate, Adenosine-5'- ( $\gamma$ -anthracene) triphosphate, Adenosine-5'- ( $\gamma$ -6-nitroanthracene) triphosphate, Adenosine-5'- ( $\gamma$ -4-methylnaphthyl) triphosphate, Adenosine-5'- ( $\gamma$ -flavonyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-methoxynaphthyl) triphosphate, Adenosine-5'- ( $\gamma$ -fluorescein) triphosphate, Adenosine-5'- ( $\gamma$ -benzoflavone) triphosphate, Adenosine-5'- ( $\gamma$ -4-chloronaphthyl) triphosphate, Adenosine-5'- ( $\gamma$ - (4-nitrophenyl)-  $\gamma'$ - (4-aminophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-bromonaphthyl) triphosphate, Adenosine-5'- ( $\gamma$ - (4-nitrophenyl)-  $\gamma'$ - (4-nitronaphthyl) triphosphate, Adenosine-5'- ( $\gamma$ -methyl) triphosphate, Adenosine-5'- ( $\gamma$ -acetoxypentyl) triphosphate, Guanosine-5'- ( $\gamma$ -methyl) triphosphate, Cytosine-5'- ( $\gamma$ -methyl) triphosphate, Adenosine-5'- ( $\gamma$ -acetoxymethyl) triphosphate (CH<sub>3</sub>OCCH<sub>2</sub>-O-NTP), Thymidine-5'- ( $\gamma$ -methyl) triphosphate, Uracil-5'- ( $\gamma$ -methyl) triphosphate, Adenosine-5'- ( $\gamma$ -acetoxylethyl) triphosphate, 3'-azido-3'-deoxythymidine-5'- ( $\gamma$ -methyl) triphosphate, Adenosine-5'- ( $\gamma$ -acetoxypentyl) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'- ( $\gamma$ -methyl)

32 triphosphate, Adenosine-5'- (γ- acetoxyhexyl) triphosphate, Adenosine-5'- (γ-ethyl) triphosphate,  
33 Adenosine-5'- (γ-2-nitroethyl) triphosphate, Adenosine-5'- (γ-propyl) triphosphate, Adenosine-5'-  
34 (γ-4-butyl) triphosphate, Adenosine-5'- (γ-3-nitropropyl) triphosphate, Adenosine-5'- (γ-hexyl)  
35 triphosphate, Adenosine-5'- (γ-octyl) triphosphate, Adenosine-5'- (γ-4-nitrobutyl)triphosphate,  
36 Adenosine-5'- (γ-decyl) triphosphate, Adenosine-5'- (γ-dodecyl) triphosphate, Adenosine-5'- (γ-5-  
37 nitropentyl)triphosphate, Adenosine-5'- (γ-isopropyl) triphosphate, Adenosine-5'- (γ-tert-butyl)  
38 triphosphate, Adenosine-5'- (γ-methyl)- (γ'-ethyl) triphosphate, Adenosine-5'- (γ-cyclohexyl)  
39 triphosphate, Adenosine-5'- (γ-methyl)- (γ'-propyl) triphosphate, Adenosine-5'- (γ-2-propenyl)  
40 triphosphate, Adenosine-5'- (γ-3-butenyl) triphosphate, Guanosine-5'- (γ-2-propenyl) triphosphate,  
41 Adenosine-5'- (γ-4-pentenyl) triphosphate, Cytosine-5'- (γ-2-propenyl) triphosphate, Adenosine-5'-  
42 (γ-5-hexenyl) triphosphate, Thymidine-5'- (γ-2-propenyl) triphosphate, Adenosine-5'- (γ-  
43 cyclohexenyl) triphosphate, Uracil-5'- (γ-2-propenyl) triphosphate, Adenosine-5'- (γ-3-  
44 propanaldehyde) triphosphate, 3'-azido-3'-deoxythymidine-5'- (γ-2-propenyl) triphosphate,  
45 Adenosine-5'-(γ-4-butanaldehyde) triphosphate, 3'-azido-2',3'-dideoxythymidine-5'- (γ-2- propenyl)  
46 triphosphate, Adenosine-5'- (γ-3-butanone) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'-  
47 (γ-2-propenyl) triphosphate, Adenosine-5'- (γ-2-propynyl) triphosphate, 3'-azido-2', 3'-  
48 dideoxythymidine-5'- (γ-2-propynyl) triphosphate, Guanosine-5'- (γ-2-propynyl) triphosphate,  
49 Cytosine-5'- (γ-2-propynyl) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'- (γ-2-propynyl)  
50 triphosphate Thymidine 5'- (γ-2-propynyl) triphosphate, Uracil-5'- (γ-2-propynyl) triphosphate,  
51 Adenosine-5'- (γ-3-butynyl) triphosphate, 3'-azido-3'-deoxythymidine-5'- (γ-2-propynyl)  
52 triphosphate, Adenosine-5'- (γ-4-pentynyl) triphosphate, Adenosine-5'- (γ-5-pentynyl) triphosphate,  
53 Adenosine-5'- (γ-4-phenyl) triphosphate, Adenosine-5'- (γ- (4 or 6 or 8 acetoxymethyl naphthyl)  
54 triphosphate, Guanosine-5'- (γ-4-phenyl) triphosphate, Cytosine-5'- (γ-4-phenyl) triphosphate,  
55 Adenosine-5'- (γ- (4-methylpyridyl)triphosphate, Thymidine-5'- (γ-4-phenyl) triphosphate, Uracil-5'-  
56 (γ-4-phenyl) triphosphate, Adenosine-5'- (γ- (5-methoxypyridyl)triphosphate, 3'-azido-3'-  
57 deoxythymidine-5'- (γ-4-phenyl) triphosphate, Adenosine-5'- (γ- (5-nitropyridyl)triphosphate, 3'-  
58 azido-2',3'-dideoxythymidine-5'- (γ-4-phenyl) triphosphate, Adenosine-5'- (γ- (5-  
59 acetoxymethylpyridyl) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'- (γ-4-phenyl)  
60 triphosphate, Adenosine-5'- (γ- (6-methyl-1-quinolyl) triphosphate, Adenosine-5'- (γ-4-  
61 carboxyphenyl) triphosphate, Adenosine-5'-(γ-(6-methoxy-1-quinolyl)triphosphate, Adenosine-5'-  
62 (γ- (4-acetoxymethyl) phenyl) triphosphate, Adenosine-5'- (γ- (4-methyl-1-quinolyl)triphosphate,

Adenosine-5'- (γ-4-nitrophenyl) triphosphate, Adenosine-5'- (γ-4-methylphenyl)triphosphate, Adenosine-5'- (γ- (6-nitro-1-quinolyl) triphosphate, Adenosine-5'- (γ-4-methoxyphenyl) triphosphate, Adenosine-5'- (γ- (4-acetoxymethylpyrenyl) triphosphate, Adenosine-5'- (γ-4-ethylphenyl) triphosphate, Adenosine-5'- (γ- (6-methylpyrenyl) triphosphate, Adenosine-5'- (γ-4-butylphenyl) triphosphate, Adenosine 5'-(γ-naphthyl) triphosphate, Adenosine-5'- (γ- (6-ethylpyrenyl) triphosphate, Adenosine-5'- (γ- (4 or 6 or 8 methyl naphthyl)triphosphate, Adenosine-5'- (γ- (6-nitropyrenyl) triphosphate, Adenosine-5'- (γ- (4 or 6 or 8 methoxynaphthyl) triphosphate, Adenosine-5'- (γ-6- (carboxysuccinimidyl fluorescein) triphosphate, Adenosine-5'- (γ- (4 or 6 or 8 nitro naphthyl) triphosphate. Adenosine-5'- (γ-6-carboxymethyl-2, 7-dichlorofluorescein) triphosphate, Adenosine-5'- (γ- (4 or 6 or 8 ethyl naphthyl) triphosphate, Adenosine-5'- (γ-4-phenyl)- (γ'-4 nitrophenyl) triphosphate, Adenosine-5'- (γ- (4 or 6 or 8 butyl naphthyl)triphosphate, Adenosine-5'- (γ-4-phenyl)- (γ'-4 aminophenyl)triphosphate, Adenosine-5'- (γ-methyl) triphosphate, Adenosine-5'- (γ-3-aminopropyl) triphosphate, Guanosine-5'- (γ-methyl) triphosphate, Adenosine-5'- (γ-4-aminobutyl) triphosphate, Cytosine-5'- (γ-methyl) triphosphate Adenosine-5'- (γ-cyclohexyl) triphosphate, Thymidine-5'- (γ-methyl) triphosphate Adenosine-5'- (γ-2-carboxyethyl) triphosphate, Uracil-5'- (γ-methyl) triphosphate, Adenosine-5'- (γ-3-carboxypropyl)triphosphate, 3'-azido-3'-deoxythymidine-5'- (7-methyl) triphosphate, Adenosine-5'- (γ-4-carboxybutyl) triphosphate, 3'-azido-2',3'-dideoxythymidine-5'- (γ-methyl) triphosphate, Adenosine-5'- (γ-2-hydroxyethyl) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'-(γ-methyl)triphosphate, Adenosine-5'- (γ-3-hydroxypropyl) triphosphate, Adenosine-5'- (γ-ethyl) triphosphate, Adenosine-5'- (γ-propyl) triphosphate, Adenosine-5'- (γ-4-hydroxybutyl) triphosphate, Adenosine-5'- (γ-4-butyl) triphosphate, Adenosine-5'- (γ-2-nitroethyl) triphosphate, Adenosine-5'- (γ-hexyl) triphosphate, Adenosine-5'- (γ-3-nitropropyl) triphosphate, Adenosine-5'- (γ-isopropyl) triphosphate, Adenosine-5'- (γ-4-nitrobutyl) triphosphate, Adenosine-5'- (γ-tert-butyl) triphosphate ,Adenosine-5'- (γ-methyl)- (γ'-ethyl)triphosphate, Adenosine-5'- (γ-cyclohexyl) triphosphate, Adenosine-5'- (γ-2-aminoethyl)triphosphate, and Adenosine-5'- (γ-methyl)- (γ'-propyl) triphosphate.

27.(currently amended) The method of claim 13, wherein the tag is covalently bonded to the modified nucleotide through a linker.



1 28.(currently amended) The method of claim 13, wherein the tag is covalently bonded to the  
2 modified nucleotide.

1 29.(previously presented) The method of claim 13, wherein the modified nucleotide comprises  
2 a  $\beta$  and/or  $\gamma$  phosphate modified nucleotide.

1 30.(previously presented) The method of claim 13, wherein the modified nucleotide comprises  
2 a  $\beta$  phosphate modified nucleotide.

1 31.(previously presented) The method of claim 13, wherein the modified nucleotide comprises  
2 a  $\gamma$  phosphate modified nucleotide.

32.(canceled)

1 33.(canceled)

2 34.(canceled)

1 35.(previously presented) The method of claim 31, wherein the modified nucleotide is selected  
2 from the group consisting of Adenosine-5'- ( $\gamma$ -ANS) triphosphate, Guanosine-5'- ( $\gamma$ -ANS)  
3 triphosphate, Cytosine-5'- ( $\gamma$ -ANS) triphosphate, Thymidine-5'- ( $\gamma$ -ANS) triphosphate, Adenosine-  
4 5'- ( $\gamma$ -4-nitrophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-iodonaphthyl), Guanosine-5'- ( $\gamma$ -4-  
5 nitrophenyl) triphosphate, triphosphate Adenosine-5'- ( $\gamma$ -6-methylnaphthyl) triphosphate, Cytosine-  
6 5'- ( $\gamma$ -4-nitrophenyl) triphosphate, Thymidine-5'- ( $\gamma$ -4-nitrophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -6-  
7 methoxynaphthyl) triphosphate, Uracil-5'- ( $\gamma$ -4-nitrophenyl) triphosphate, 3'-azido-3'-  
8 deoxythymidine-5'- ( $\gamma$ -4-nitrophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -6-aminonaphthyl) triphosphate,  
9 3'-azido-2', 3'-dideoxythymidine-5'- ( $\gamma$ -4- nitrophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -6-  
10 nitronaphthyl) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'- ( $\gamma$ -4-  
11 nitrophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -6-chloronaphthyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-  
12 aminophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -6-bromonaphthyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-  
13 methylphenyl) triphosphate, Adenosine-5'- ( $\gamma$ -6-iodonaphthyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-  
14 methoxyphenyl) triphosphate, Adenosine-5'- ( $\gamma$ -4'-hydroxybiphenyl) triphosphate, Adenosine-5'- ( $\gamma$ -  
15 4-chlorophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -8-quinolyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-

bromophenyl) triphosphate, Adenosine-5'- (γ-3-pyridyl) triphosphate, Adenosine-5'- (γ-umbelliferone), Adenosine-5'- (γ-4-iodophenyl) triphosphate, Adenosine-5'- (γ-4-nitronaphthyl) triphosphate, Adenosine-5'- (γ-resorufin) triphosphate, Adenosine-5'- (γ-pyrene) triphosphate, Adenosine-5'- (γ-4-aminonaphthyl) triphosphate, Adenosine-5'- (γ-anthracene) triphosphate, Adenosine-5'- (γ-6-nitroanthracene) triphosphate, Adenosine-5'- (γ-4-methylnaphthyl) triphosphate, Adenosine-5'- (γ-flavonyl) triphosphate, Adenosine-5'- (γ-4-methoxynaphthyl) triphosphate, Adenosine-5'- (γ-fluorescein) triphosphate, Adenosine-5'- (γ-benzoflavone) triphosphate, Adenosine-5'- (γ-4-chloronaphthyl) triphosphate, Adenosine-5'- (γ- (4-nitrophenyl)- γ'- (4-aminophenyl) triphosphate, Adenosine-5'- (γ-4-bromonaphthyl) triphosphate, Adenosine-5'- (γ- (4-nitrophenyl)- γ'- (4-nitronaphthyl) triphosphate, Adenosine-5'- (γ-methyl) triphosphate, Adenosine-5'- (γ-acetoxypropyl) triphosphate, Guanosine-5'- (γ-methyl) triphosphate, Cytosine-5'- (γ-methyl) triphosphate, Adenosine-5'- (γ-acetoxymethyl) triphosphate (CH<sub>3</sub>OOCCCH<sub>2</sub>-O-NTP), Thymidine-5'- (γ-methyl) triphosphate, Uracil-5'- (γ-methyl) triphosphate, Adenosine-5'- (γ-acetoxyethyl) triphosphate, 3'-azido-3'-deoxythymidine-5'- (γ-methyl) triphosphate, Adenosine-5'- (γ-acetoxybutyl) triphosphate, 3'-azido-2', 3'-dideoxythymidine-5'- (γ-methyl) triphosphate, Adenosine-5'- (γ, acetoxypentyl) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'- (γ-methyl) triphosphate, Adenosine-5'- (γ-acetoxihexyl) triphosphate, Adenosine-5'- (γ-ethyl) triphosphate, Adenosine-5'- (γ-2-nitroethyl) triphosphate, Adenosine-5'- (γ-propyl) triphosphate, Adenosine-5'- (γ-4-butyl) triphosphate, Adenosine-5'- (γ-3-nitropropyl) triphosphate, Adenosine-5'- (γ-hexyl) triphosphate, Adenosine-5'- (γ-octyl) triphosphate, Adenosine-5'- (γ-4-nitrobutyl) triphosphate, Adenosine-5'- (γ-decyl) triphosphate, Adenosine-5'- (γ-dodecyl) triphosphate, Adenosine-5'- (γ-5-nitropentyl) triphosphate, Adenosine-5'- (γ-isopropyl) triphosphate, Adenosine-5'- (γ-tert-butyl) triphosphate, Adenosine-5'- (γ-methyl)- (γ'-ethyl) triphosphate, Adenosine-5'- (γ-cyclohexyl) triphosphate, Adenosine-5'- (γ-methyl)- (γ'-propyl) triphosphate, Adenosine-5'- (γ-2-propenyl) triphosphate, Adenosine-5'- (γ-3-butenyl) triphosphate, Guanosine-5'- (γ-2-propenyl) triphosphate, Adenosine-5'- (γ-4-pentenyl) triphosphate, Cytosine-5'- (γ-2-propenyl) triphosphate, Adenosine-5'- (γ-5-hexenyl) triphosphate, Thymidine-5'- (γ-2-propenyl) triphosphate, Adenosine-5'- (γ-cyclohexenyl) triphosphate, Uracil-5'- (γ-2-propenyl) triphosphate, Adenosine-5'- (γ-3-propanaldehyde) triphosphate, 3'-azido-3'-deoxythymidine-5'- (γ-2-propenyl) triphosphate, Adenosine-5'- (γ-4-butanaldehyde) triphosphate, 3'-azido-2', 3'-dideoxythymidine-5'- (γ-2-propenyl) triphosphate, Adenosine-5'- (γ-3-butanone) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'-

( $\gamma$ -2-propenyl) triphosphate, Adenosine-5'- ( $\gamma$ -2-propynyl) triphosphate, 3'-azido-2', 3'-  
dideoxythymidine-5'- ( $\gamma$ -2-propynyl) triphosphate, Guanosine-5'- ( $\gamma$ -2-propynyl) triphosphate,  
Cytosine-5'- ( $\gamma$ -2-propynyl) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'- ( $\gamma$ -2-propynyl)  
triphosphate Thymidine 5'- ( $\gamma$ -2-propynyl) triphosphate, Uracil-5'- ( $\gamma$ -2-propynyl) triphosphate,  
Adenosine-5'- ( $\gamma$ -3-butynyl) triphosphate, 3'-azido-3'-deoxythymidine-5'- ( $\gamma$ -2-propynyl)  
triphosphate, Adenosine-5'- ( $\gamma$ -4-pentynyl) triphosphate, Adenosine-5'- ( $\gamma$ -5-pentynyl) triphosphate,  
Adenosine-5'- ( $\gamma$ -4-phenyl) triphosphate, Adenosine-5'- ( $\gamma$ - (4 or 6 or 8 acetoxymethyl naphthyl)  
triphosphate, Guanosine-5'- ( $\gamma$ -4-phenyl) triphosphate, Cytosine-5'- ( $\gamma$ -4-phenyl) triphosphate,  
Adenosine-5'- ( $\gamma$ - (4-methylpyridyl)triphosphate, Thymidine-5'- ( $\gamma$ -4-phenyl) triphosphate, Uracil-5'-  
( $\gamma$ -4-phenyl) triphosphate, Adenosine-5'- ( $\gamma$ - (5-methoxypyridyl)triphosphate, 3'-azido-3'-  
deoxythymidine-5'- ( $\gamma$ -4-phenyl) triphosphate, Adenosine-5'- ( $\gamma$ - (5-nitropyridyl)triphosphate, 3'-  
azido-2',3'-dideoxythymidine-5'- ( $\gamma$ -4-phenyl) triphosphate, Adenosine-5'- ( $\gamma$ - (5-  
acetoxymethylpyridyl) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'- ( $\gamma$ -4-phenyl)  
triphosphate, Adenosine-5'- ( $\gamma$ - (6-methyl-1-quinolyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-  
carboxyphenyl) triphosphate, Adenosine-5'-( $\gamma$ -(6-methoxy-1-quinolyl)triphosphate, Adenosine-5'-  
( $\gamma$ - (4-acetoxymethyl) phenyl) triphosphate, Adenosine-5'- ( $\gamma$ - (4-methyl-1-quinolyl)triphosphate,  
Adenosine-5'- ( $\gamma$ -4-nitrophenyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-methylphenyl)triphosphate,  
Adenosine-5'- ( $\gamma$ - (6-nitro-1-quinolyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-methoxyphenyl)  
triphosphate, Adenosine-5'- ( $\gamma$ - (4-acetoxymethylpyrenyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-  
ethylphenyl) triphosphate, Adenosine-5'- ( $\gamma$ - (6-methylpyrenyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-  
butylphenyl) triphosphate, Adenosine 5'-( $\gamma$ -naphthyl) triphosphate, Adenosine-5'- ( $\gamma$ - (6-  
ethylpyrenyl) triphosphate, Adenosine-5'- ( $\gamma$ - (4 or 6 or 8 methyl naphthyl)triphosphate, Adenosine-  
5'- ( $\gamma$ - (6-nitropyrenyl) triphosphate, Adenosine-5'- ( $\gamma$ - (4 or 6 or 8 methoxynaphthyl) triphosphate,  
Adenosine-5'- ( $\gamma$ -6- (carboxysuccinimidyl fluorescein) triphosphate, Adenosine-5'- ( $\gamma$ - (4 or 6 or 8  
nitro naphthyl) triphosphate. Adenosine-5'- ( $\gamma$ -6-carboxymethyl-2, 7-dichlorofluorescein)  
triphosphate, Adenosine-5'- ( $\gamma$ - (4 or 6 or 8 ethyl naphthyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-phenyl)-  
( $\gamma$ -4 nitrophenyl) triphosphate, Adenosine-5'- ( $\gamma$ - (4 or 6 or 8 butyl naphthyl)triphosphate,  
Adenosine-5'- ( $\gamma$ -4-phenyl)- ( $\gamma$ -4 aminophenyl)triphosphate, Adenosine-5'- ( $\gamma$ -methyl) triphosphate,  
Adenosine-5'- ( $\gamma$ -3-aminopropyl) triphosphate, Guanosine-5'- ( $\gamma$ -methyl) triphosphate, Adenosine-5'-  
( $\gamma$ -4-aminobutyl) triphosphate, Cytosine-5'- ( $\gamma$ -methyl) triphosphate Adenosine-5'- ( $\gamma$ -cyclohexyl)  
triphosphate, Thymidine-5'- ( $\gamma$ -methyl) triphosphate Adenosine-5'- ( $\gamma$ -2-carboxyethyl) triphosphate,

78 Uracil-5'- (γ-methyl) triphosphate, Adenosine-5'- (γ-3-carboxypropyl)triphosphate, 3'-azido-3'-  
79 deoxythymidine-5'- (7-methyl) triphosphate, Adenosine-5'- (γ-4-carboxybutyl) triphosphate, 3'-  
80 azido-2',3'-dideoxythymidine-5'- (γ-methyl) triphosphate, Adenosine-5'- (γ-2-hydroxyethyl)  
81 triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'-(γ-methyl)triphosphate, Adenosine-5'- (γ-3-  
82 hydroxypropyl) triphosphate, Adenosine-5'- (γ-ethyl) triphosphate, Adenosine-5'- (γ-propyl)  
83 triphosphate, Adenosine-5'- (γ-4-hydroxybutyl) triphosphate, Adenosine-5'- (γ-4-butyl) triphosphate,  
84 Adenosine-5'- (γ-2-nitroethyl) triphosphate, Adenosine-5'- (γ-hexyl) triphosphate, Adenosine-5'- (γ-  
85 3-nitropropyl) triphosphate, Adenosine-5'- (γ-isopropyl) triphosphate, Adenosine-5'- (γ-4-nitrobutyl)  
86 triphosphate, Adenosine-5'- (γ-tert-butyl) triphosphate ,Adenosine-5'- (γ-methyl)- (γ'-  
87 ethyl)triphosphate, Adenosine-5'- (γ-cyclohexyl) triphosphate, Adenosine-5'- (γ-2-  
88 aminoethyl)triphosphate, and Adenosine-5'- (γ-methyl)- (γ'-propyl) triphosphate.

1 36.(previously presented) The method of claim 7, wherein the polymerizing agent is selected  
2 from the group consisting of naturally occurring or synthetic polymerases and reverse transcriptases.

1 37.(previously presented) The method of claim 13, wherein the polymerizing agent is selected  
2 from the group consisting of naturally occurring or synthetic polymerases and reverse transcriptases.

1 38.(currently amended) The kit of claim 15, wherein the tag is covalently bonded to the  
2 modified nucleotide through a linker.

1 39.(currently amended) The kit of claim 15, wherein the tag is covalently bonded to the  
2 modified nucleotide.

1 40.(previously presented) The kit of claim 15, wherein the modified nucleotide comprises a β  
2 and/or γ phosphate modified nucleotide.

1 41.(previously presented) The kit of claim 15, wherein the modified nucleotide comprises a β  
2 phosphate modified nucleotide.

1 42.(previously presented) The kit of claim 15, wherein the modified nucleotide comprises a  $\gamma$   
2 phosphate modified nucleotide.

1 43.(previously presented) The kit of claim 39, wherein the molecular tag comprises a  
2 fluorophore selected from the group consisting of 4-acetamido-4'-isothiocyanatostilbene-  
3 2,2'-disulfonic acid; acridine and derivatives: acridine, acridine isothiocyanate; 5- (2'-aminoethyl)  
4 aminonaphthalene-1-sulfonic acid (EDANS); 4-amino-3-vinylsulfonyl phenyl] naphthalimide-3,5  
5 disulfonate; - (4-anilino-1-naphthyl) maleimide; anthranilamide; BODIPY; Brilliant Yellow;  
6 coumarin and derivatives: coumarin, 7-amino-4-methylcoumarin (AMC, Coumarin 120), 7-amino-  
7 4-trifluoromethylcoumarin (Coumarin 151); cyanine dyes; cyanosine; 4', 6-diaminidino-  
8 2-phenylindole (DAPI); 5', 5''-dibromopyrogallol-sulfonaphthalein (Bromopyrogallol Red); 7-  
9 diethylamino-3- (4'-isothiocyanatophenyl)-4-methylcoumarin; diethylenetriamine pentaacetate; 4,4'-  
10 diisothiocyanatodihydro-stilbene-2,2'-disulfonic acid; 4,4' diisothiocyanatostilbene-2,2'-disulfonic  
11 acid; 5-dimethylamino naphthalene-1-sulfonyl chloride (DNS, dansylchloride); 4-  
12 dimethylaminophenylazophenyl-4'-isothiocyanate (DABITC); eosin and derivatives: eosin, eosin  
13 isothiocyanate, erythrosin and derivatives: erythrosin B, erythrosin, isothiocyanate; ethidium;  
14 fluorescein and derivatives: 5-carboxyfluorescein (FAM), 5- (4, 6-dichlorotriazin-2-yl)  
15 aminofluorescein (DTAF), 2', 7'-dimethoxy-4',5'-dichloro-6-carboxyfluorescein (JOE), fluorescein,  
16 fluorescein isothiocyanate, QFITC, (XRITC); fluorescamine; IR144; IR1446; Malachite Green  
17 isothiocyanate; 4-methylumbelliferoneortho cresolphthalein; nitrotyrosine; pararosaniline; Phenol  
18 Red; B-phycoerythrin; o-phthalaldehyde; pyrene and derivatives: pyrene, pyrene butyrate,  
19 succinimidyl 1-pyrene; butyrate quantum dots; Reactive Red 4 (Cibacron<sup>TM</sup> Brilliant Red 3B-A)  
20 rhodamine and derivatives: 6-carboxy-X-rhodamine (ROX), 6-carboxyrhodamine (R6G), lissamine  
21 rhodamine B sulfonyl chloride rhodamine (Rhod), rhodamine B, rhodamine 123, rhodamine X  
22 isothiocyanate, sulforhodamine B, sulforhodamine 101, sulfonyl chloride derivative of  
23 sulforhodamine 101 (Texas Red); N, N, N', N'-tetramethyl-6-carboxyrhodamine (TAMRA);  
24 tetramethyl rhodamine; tetramethyl rhodamine isothiocyanate (TRITC); riboflavin; rosolic acid;  
25 terbium chelate derivatives; Cy 3; Cy 5; Cy 5.5; Cy 7; IRD 700; IRD 800; La Jolla Blue; phthalocyanine;  
26 and naphthalocyanine.

1 44.(previously presented) The kit of claim 39, wherein the molecular tag is selected from the  
2 group consisting of alkyl groups having between 1 and 30 carbon atoms, aryl groups having between  
3 about 6 and about 40 carbon atoms, or alkaryl and aralkyl groups having between about 7 and about  
4 40 carbon atoms, or mixture or combinations thereof, where the carbon atoms are replaced by one or  
5 more hetero atoms in the structure provided the structure represents a stable molecular system, where  
6 the hetero atoms selected from the group consisting of P, S, Si, N, and O.

1 45.(previously presented) The kit of claim 39, wherein the molecular tag is selected from the  
2 group consisting of 4-aminophenol, 6-aminonaphthol, 4-nitrophenol, 6-nitronaphthol, 4-  
3 methylphenol, 6-chloronaphthol, 4-methoxyphenol, 6-bromonaphthol, 4-chlorophenol, 6-  
4 iodonaphthol, 4-bromophenol, 4, 4'-dihydroxybiphenyl, 4-iodophenol, 8-hydroxyquinoline, 4-  
5 nitronaphthol, 3-hydroxypyridine, 4-aminonaphthol, umbelliferone, 4-methylnaphthol, resorufin, 4-  
6 methoxynaphthol, 8-hydroxypyrene, 4-chloronaphthol, 9-hydroxyanthracene, 4-bromonaphthol, 6-  
7 nitro-9-hydroxyanthracene, 4-iodonaphthol, 3-hydroxyflavone, 6-methylnaphthol, fluorescein, 6-  
8 methoxynaphthol, 3-hydroxybenzoflavone, 1-hydroxy-2-propyne, 1-hydroxy-4-pentyne, 1-hydroxy-  
9 3-butyne, 1-hydroxy-5-hexyne, Methanol, Ethanol, Propanol, Isopropanol, Butanol, Tert-butanol,  
10 Hexanol, Cyclohexanol, Heptanol, Octanol, Decanol, Undecanol, Dodecanol, 1-acetoxymethanol  
11 (CH<sub>3</sub>OCCH<sub>2</sub>-O-NTP), 2-acetoxyethanol, 3-acetoxypentanol, 4-acetoxybutanol, 5-acetoxypentanol,  
12 6-acetoxyhexanol, 2-nitroethanol, 3-nitropropanol, 4-nitrobutanol, 5-nitropentanol, 5-nitrohexanol,  
13 1-hydroxy-3-propene, 1-hydroxy-2-cyclohexene, 1-hydroxy-4-butene, 1-hydroxy-3-propaldehyde,  
14 1-hydroxy-5-pentene, 1-hydroxy-4-butanaldehyde, 1-hydroxy-6-hexene, 1-hydroxy-3-Butanone,  
15 Phenol, 4-methyl-3-hydroxypyridine, 4-Carboxyphenol, 5-methoxy-3-hydroxypyridine, 4-  
16 Acetoxymethylphenol, 5-nitro-3-hydroxypyridine, 4-nitrophenol, 5-acetoxymethyl-3-  
17 hydroxypyridine, 4-methylphenol, 6-methyl-8-hydroxyquinoline, 4-methoxyphenol 6-methoxy-8-  
18 hydroxyquinoline, 4-ethylphenol, 4-methyl-8-hydroxyquinoline, 4-butylphenol, 6-nitro-8-  
19 hydroxyquinoline, naphthol, 4-acetoxymethyl-8-hydroxyquinoline, 4 or 6 or 8 methylnaphthol  
20 pyrene, 4 or 6 or 8 methoxynaphthol, 6-methyl-8-hydroxypyrene, 4 or 6 or 8 nitronaphthol, 6-ethyl-  
21 8-hydroxypyrene, 4 or 6 or 8 ethylnaphthol, 6-nitro-8-hydroxypyrene, 4 or 6 or 8 butylnaphthol 6-  
22 (carboxysuccinimidylester) fluorescein, 4 or 6 or 8 acetoxymethylnaphthol, 6-carboxymethyl-2, 7-  
23 dichlorofluorescein, Methanol Cyclohexanol, 2-carboxy ethanol, 3-carboxypropanol, 4-

24 carboxybutanol, 2-hydroxyethanol, 3-hydroxypropanol, 4-hydroxybutanol, 2-aminoethanol, 2-  
25 nitroethanol, 3-aminopropanol, 3-nitropropanol, 4-aminobutanol, and 4-nitrobutanol.

1 46.(previously presented) The kit of claim 42, wherein the modified nucleotide is selected from  
2 the group consisting of Adenosine-5'- (γ-ANS) triphosphate, Guanosine-5'- (γ-ANS) triphosphate,  
3 Cytosine-5'- (γ-ANS) triphosphate, Thymidine-5'- (γ-ANS) triphosphate, Adenosine-5'- (γ-4-  
4 nitrophenyl) triphosphate, Adenosine-5'- (γ-4-iodonaphthyl), Guanosine-5'- (γ-4-nitrophenyl)  
5 triphosphate, triphosphate Adenosine-5'- (γ-6-methylnaphthyl) triphosphate, Cytosine-5'- (γ-4-  
6 nitrophenyl) triphosphate, Thymidine-5'- (γ-4-nitrophenyl) triphosphate, Adenosine-5'- (γ-6-  
7 methoxynaphthyl) triphosphate, Uracil-5'- (γ-4-nitrophenyl) triphosphate, 3'-azido-3'-  
8 deoxythymidine-5'-(γ-4-nitrophenyl)triphosphate, Adenosine-5'- (γ-6-aminonaphthyl) triphosphate,  
9 3'-azido-2', 3'-dideoxythymidine-5'- (γ-4- nitrophenyl)triphosphate, Adenosine-5'- (γ-6-  
10 nitronaphthyl) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'- (γ-4-  
11 nitrophenyl)triphosphate, Adenosine-5'- (γ-6-chloronaphthyl) triphosphate, Adenosine-5'- (γ-4-  
12 aminophenyl) triphosphate, Adenosine-5'- (γ-6-bromonaphthyl) triphosphate, Adenosine-5'- (γ-4-  
13 methylphenyl) triphosphate, Adenosine-5'- (γ-6-iodonaphthyl) triphosphate, Adenosine-5'- (γ-4-  
14 methoxyphenyl) triphosphate, Adenosine-5'-(γ-4'-hydroxybiphenyl) triphosphate, Adenosine-5'- (γ-  
15 4-chlorophenyl) triphosphate, Adenosine-5'- (γ-8-quinolyl) triphosphate, Adenosine-5'- (γ-4-  
16 bromophenyl) triphosphate, Adenosine-5'- (γ-3-pyridyl) triphosphate, Adenosine-5'- (γ-  
17 umbelliferone), Adenosine-5'- (γ-4-iodophenyl) triphosphate, Adenosine-5'- (γ-4-nitronaphthyl)  
18 triphosphate, Adenosine-5'- (γ-resorufin) triphosphate, Adenosine-5'- (γ-pyrene) triphosphate,  
19 Adenosine-5'- (γ-4-aminonaphthyl) triphosphate, Adenosine-5'- (γ-anthracene) triphosphate,  
20 Adenosine-5'-(Γ-6-nitroanthracene) triphosphate, Adenosine-5'- (γ-4-methylnaphthyl) triphosphate,  
21 Adenosine-5'- (γ-flavonyl) triphosphate, Adenosine-5'-(γ-4-methoxynaphthyl) triphosphate,  
22 Adenosine-5'-(γ-fluorescein) triphosphate, Adenosine-5'- (γ-benzoflavone) triphosphate, Adenosine-  
23 5'- (γ-4-chloronaphthyl) triphosphate, Adenosine-5'- (γ- (4-nitrophenyl)- γ'- (4-aminophenyl)  
24 triphosphate, Adenosine-5'- (γ-4-bromonaphthyl) triphosphate, Adenosine-5'- (γ- (4-nitrophenyl)-  
25 γ'- (4-nitronaphthyl) triphosphate, Adenosine-5'- (γ-methyl) triphosphate, Adenosine-5'- (γ-  
26 acetoxypentyl)triphosphate, Guanosine-5'- (γ-methyl) triphosphate, Cytosine-5'- (γ-methyl)  
27 triphosphate, Adenosine-5'- (γ-acetoxymethyl)triphosphate (CH<sub>3</sub>OCCH<sub>2</sub>-O-NTP), Thymidine-5'-  
28 (γ-methyl) triphosphate, Uracil-5'- (γ-methyl) triphosphate, Adenosine-5'-(γ-acetoxyethyl)

29 triphosphate, 3'-azido-3'-deoxythymidine-5'-( $\gamma$ -methyl)triphosphate, Adenosine-5'- ( $\gamma$ -  
30 acetoxybutyl)triphosphate, 3'-azido-2', 3'-dideoxythymidine-5'- ( $\gamma$ -methyl) triphosphate, Adenosine-  
31 5'- ( $\gamma$ , acetoxypropyl) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'- ( $\gamma$ -methyl)  
32 triphosphate, Adenosine-5'- ( $\gamma$ - acetoxyhexyl) triphosphate, Adenosine-5'- ( $\gamma$ -ethyl) triphosphate,  
33 Adenosine-5'- ( $\gamma$ -2-nitroethyl) triphosphate, Adenosine-5'- ( $\gamma$ -propyl) triphosphate, Adenosine-5'-  
34 ( $\gamma$ -4-butyl) triphosphate, Adenosine-5'- ( $\gamma$ -3-nitropropyl) triphosphate, Adenosine-5'- ( $\gamma$ -hexyl)  
35 triphosphate, Adenosine-5'- ( $\gamma$ -octyl) triphosphate, Adenosine-5'- ( $\gamma$ -4-nitrobutyl)triphosphate,  
36 Adenosine-5'- ( $\gamma$ -decyl) triphosphate, Adenosine-5'- ( $\gamma$ -dodecyl) triphosphate, Adenosine-5'- ( $\gamma$ -5-  
37 nitropentyl)triphosphate, Adenosine-5'- ( $\gamma$ -isopropyl) triphosphate, Adenosine-5'- ( $\gamma$ -tert-butyl)  
38 triphosphate, Adenosine-5'- ( $\gamma$ -methyl)- ( $\gamma'$ -ethyl) triphosphate, Adenosine-5'- ( $\gamma$ -cyclohexyl)  
39 triphosphate, Adenosine-5'- ( $\gamma$ -methyl)- ( $\gamma'$ -propyl) triphosphate, Adenosine-5'- ( $\gamma$ -2-propenyl)  
40 triphosphate, Adenosine-5'- ( $\gamma$ -3-butenyl) triphosphate, Guanosine-5'- ( $\gamma$ -2-propenyl) triphosphate,  
41 Adenosine-5'- ( $\gamma$ -4-pentenyl) triphosphate, Cytosine-5'- ( $\gamma$ -2-propenyl) triphosphate, Adenosine-5'-  
42 ( $\gamma$ -5-hexenyl) triphosphate, Thymidine-5'- ( $\gamma$ -2-propenyl) triphosphate, Adenosine-5'- ( $\gamma$ -  
43 cyclohexenyl) triphosphate, Uracil-5'- ( $\gamma$ -2-propenyl) triphosphate, Adenosine-5'- ( $\gamma$ -3-  
44 propanaldehyde) triphosphate, 3'-azido-3'-deoxythymidine-5'- ( $\gamma$ -2-propenyl) triphosphate,  
45 Adenosine-5'-( $\gamma$ -4-butanaldehyde) triphosphate, 3'-azido-2',3'-dideoxythymidine-5'- ( $\gamma$ -2-propenyl)  
46 triphosphate, Adenosine-5'- ( $\gamma$ -3-butanone) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'-  
47 ( $\gamma$ -2-propenyl) triphosphate, Adenosine-5'- ( $\gamma$ -2-propynyl) triphosphate, 3'-azido-2', 3'-  
48 dideoxythymidine-5'- ( $\gamma$ -2-propynyl) triphosphate, Guanosine-5'- ( $\gamma$ -2-propynyl) triphosphate,  
49 Cytosine-5'- ( $\gamma$ -2-propynyl) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'- ( $\gamma$ -2-propynyl)  
50 triphosphate Thymidine 5'- ( $\gamma$ -2-propynyl) triphosphate, Uracil-5'- ( $\gamma$ -2-propynyl) triphosphate,  
51 Adenosine-5'- ( $\gamma$ -3-butynyl) triphosphate, 3'-azido-3'-deoxythymidine-5'- ( $\gamma$ -2-propynyl)  
52 triphosphate, Adenosine-5'- ( $\gamma$ -4-pentynyl) triphosphate, Adenosine-5'- ( $\gamma$ -5-pentynyl) triphosphate,  
53 Adenosine-5'- ( $\gamma$ -4-phenyl) triphosphate, Adenosine-5'- ( $\gamma$ - (4 or 6 or 8 acetoxymethyl naphthyl)  
54 triphosphate, Guanosine-5'- ( $\gamma$ -4-phenyl) triphosphate, Cytosine-5'- ( $\gamma$ -4-phenyl) triphosphate,  
55 Adenosine-5'- ( $\gamma$ - (4-methylpyridyl)triphosphate, Thymidine-5'- ( $\gamma$ -4-phenyl) triphosphate, Uracil-5'-  
56 ( $\gamma$ -4-phenyl) triphosphate, Adenosine-5'- ( $\gamma$ - (5-methoxypyridyl)triphosphate, 3'-azido-3'-  
57 deoxythymidine-5'- ( $\gamma$ -4-phenyl) triphosphate, Adenosine-5'- ( $\gamma$ - (5-nitropyridyl)triphosphate, 3'-  
58 azido-2',3'-dideoxythymidine-5'- ( $\gamma$ -4-phenyl) triphosphate, Adenosine-5'- ( $\gamma$ - (5-  
59 acetoxymethylpyridyl) triphosphate, 2', 3'-didehydro-2', 3'-dideoxythymidine-5'- ( $\gamma$ -4-phenyl)



triphosphate, Adenosine-5'-( $\gamma$ -(6-methyl-1-quinolyl) triphosphate, Adenosine-5'-( $\gamma$ -4-carboxyphenyl) triphosphate, Adenosine-5'-( $\gamma$ -(6-methoxy-1-quinolyl)triphosphate, Adenosine-5'-( $\gamma$ -(4-acetoxymethyl) phenyl) triphosphate, Adenosine-5'-( $\gamma$ -(4-methyl-1-quinolyl)triphosphate, Adenosine-5'-( $\gamma$ -4-nitrophenyl) triphosphate, Adenosine-5'-( $\gamma$ -4-methylphenyl)triphosphate, Adenosine-5'-( $\gamma$ -(6-nitro-1-quinolyl) triphosphate, Adenosine-5'-( $\gamma$ -4-methoxyphenyl) triphosphate, Adenosine-5'-( $\gamma$ -(4-acetoxymethylpyrenyl) triphosphate, Adenosine-5'-( $\gamma$ -4-ethylphenyl) triphosphate, Adenosine-5'-( $\gamma$ -(6-methylpyrenyl) triphosphate, Adenosine-5'-( $\gamma$ -4-butylphenyl) triphosphate, Adenosine 5'-( $\gamma$ -naphthyl) triphosphate, Adenosine-5'-( $\gamma$ -(6-ethylpyrenyl) triphosphate, Adenosine-5'-( $\gamma$ -(4 or 6 or 8 methyl naphthyl)triphosphate, Adenosine-5'-( $\gamma$ -(6-nitropyrenyl) triphosphate, Adenosine-5'-( $\gamma$ -(4 or 6 or 8 methoxynaphthyl) triphosphate, Adenosine-5'-( $\gamma$ -6-(carboxysuccinimidyl fluorescein) triphosphate, Adenosine-5'-( $\gamma$ -(4 or 6 or 8 nitro naphthyl) triphosphate. Adenosine-5'-( $\gamma$ -6-carboxymethyl-2, 7-dichlorofluorescein) triphosphate, Adenosine-5'-( $\gamma$ -(4 or 6 or 8 ethyl naphthyl) triphosphate, Adenosine-5'-( $\gamma$ -4-phenyl)-( $\gamma$ '-4 nitrophenyl) triphosphate, Adenosine-5'-( $\gamma$ -(4 or 6 or 8 butyl naphthyl)triphosphate, Adenosine-5'-( $\gamma$ -4-phenyl)-( $\gamma$ '-4 aminophenyl)triphosphate, Adenosine-5'-( $\gamma$ -methyl) triphosphate, Adenosine-5'-( $\gamma$ -3-aminopropyl) triphosphate, Guanosine-5'-( $\gamma$ -methyl) triphosphate, Adenosine-5'-( $\gamma$ -4-aminobutyl) triphosphate, Cytosine-5'-( $\gamma$ -methyl) triphosphate Adenosine-5'-( $\gamma$ -cyclohexyl) triphosphate, Thymidine-5'-( $\gamma$ -methyl) triphosphate Adenosine-5'-( $\gamma$ -2-carboxyethyl) triphosphate, Uracil-5'-( $\gamma$ -methyl) triphosphate, Adenosine-5'-( $\gamma$ -3-carboxypropyl)triphosphate, 3'-azido-3'-deoxythymidine-5'-(7-methyl) triphosphate, Adenosine-5'-( $\gamma$ -4-carboxybutyl) triphosphate, 3'-azido-2',3'-dideoxythymidine-5'-( $\gamma$ -methyl) triphosphate, Adenosine-5'-( $\gamma$ -2-hydroxyethyl) triphosphate, 2',3'-didehydro-2',3'-dideoxythymidine-5'-( $\gamma$ -methyl)triphosphate, Adenosine-5'-( $\gamma$ -3-hydroxypropyl) triphosphate, Adenosine-5'-( $\gamma$ -ethyl) triphosphate, Adenosine-5'-( $\gamma$ -propyl) triphosphate, Adenosine-5'-( $\gamma$ -4-hydroxybutyl) triphosphate, Adenosine-5'-( $\gamma$ -4-butyl) triphosphate, Adenosine-5'-( $\gamma$ -2-nitroethyl) triphosphate, Adenosine-5'-( $\gamma$ -hexyl) triphosphate, Adenosine-5'-( $\gamma$ -3-nitropropyl) triphosphate, Adenosine-5'-( $\gamma$ -isopropyl) triphosphate, Adenosine-5'-( $\gamma$ -4-nitrobutyl) triphosphate, Adenosine-5'-( $\gamma$ -tert-butyl) triphosphate ,Adenosine-5'-( $\gamma$ -methyl)-( $\gamma$ '-ethyl)triphosphate, Adenosine-5'-( $\gamma$ -cyclohexyl) triphosphate, Adenosine-5'-( $\gamma$ -2-aminoethyl)triphosphate, and Adenosine-5'-( $\gamma$ -methyl)-( $\gamma$ '-propyl) triphosphate.

1      47.(previously presented)    The kit of claim 15, wherein the polymerizing agent is selected from  
2      the group consisting of naturally occurring or synthetic polymerases and reverse transcriptases.